RYSAVY RESEARCH

MobileFuture
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Net Neutrality Regulatory Proposals: Operational and Engineering Implications for Wireless Networks and the Consumers They Serve

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WA DC, 2010

Agenda

- Wireless Industry Innovation
- Capacities
- Data Consumption
- Quality of Service
- Network Management
- Device Impact

This presentation is a summary of the Rysavy Research paper published by Mobile Future at http://www.mobilefuture.org/FCCJanuary14

Innovation Areas

Mobile Broadband: Wireless Technology Innovation
Combined with Internet Innovation

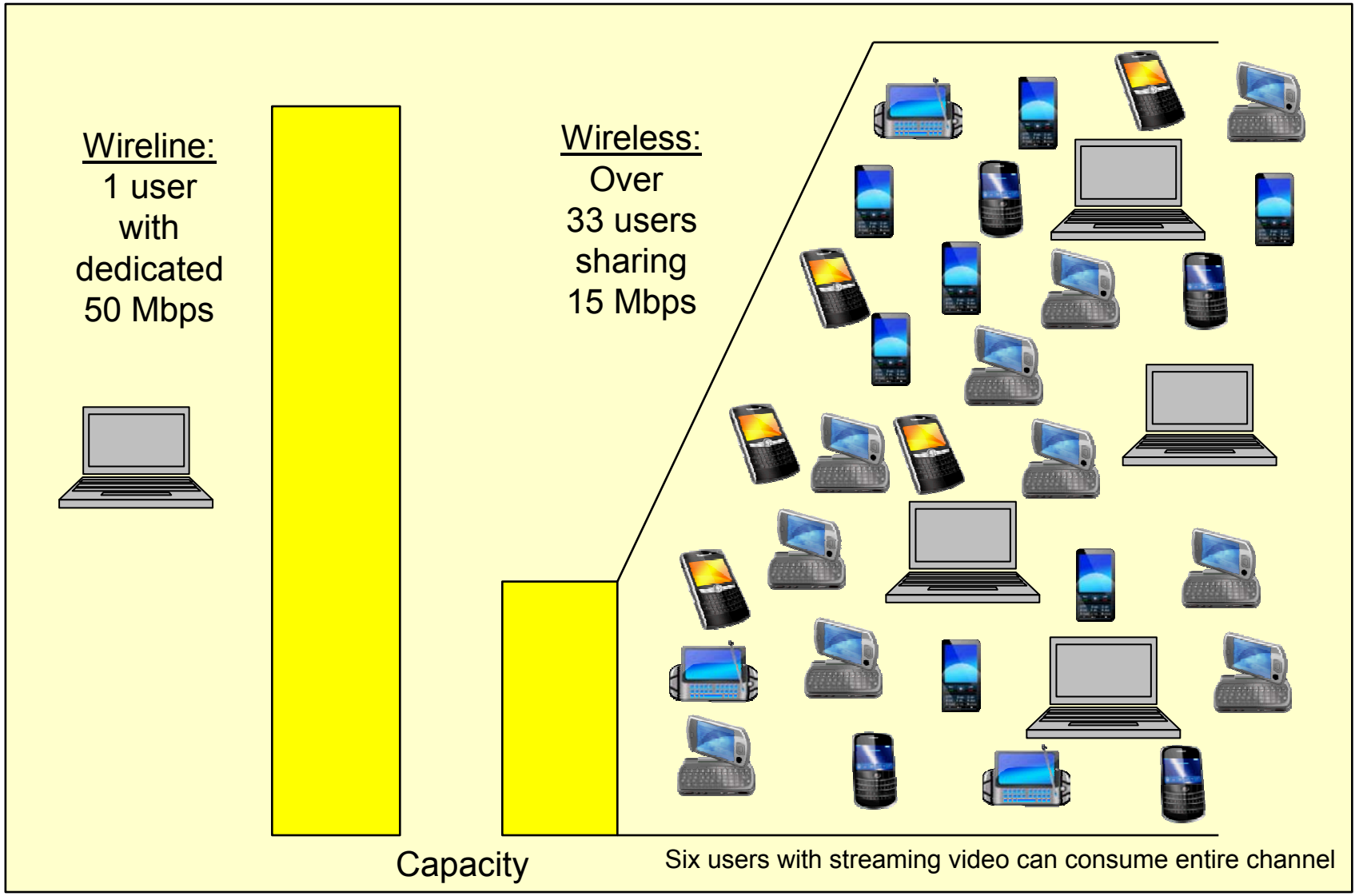
Innovation Area	Technologies
Processing	Digital signal processing for radio, huge computing power
Radio	Modulation, multiplexing, antennas
Internet Protocols	IP-based multimedia services including video and voice
Memory	Large capacity storage for songs, photos, video
Mobile Platforms	Smartphones, notebooks, netbooks, smartbooks, mobile Internet devices
Applications	Well over 100,000 for smartphones alone
Web Technologies	Internet-hosted applications/content

Wireless Capacities

Capacity: extremely finite.
Small number of users can overwhelm capacity.

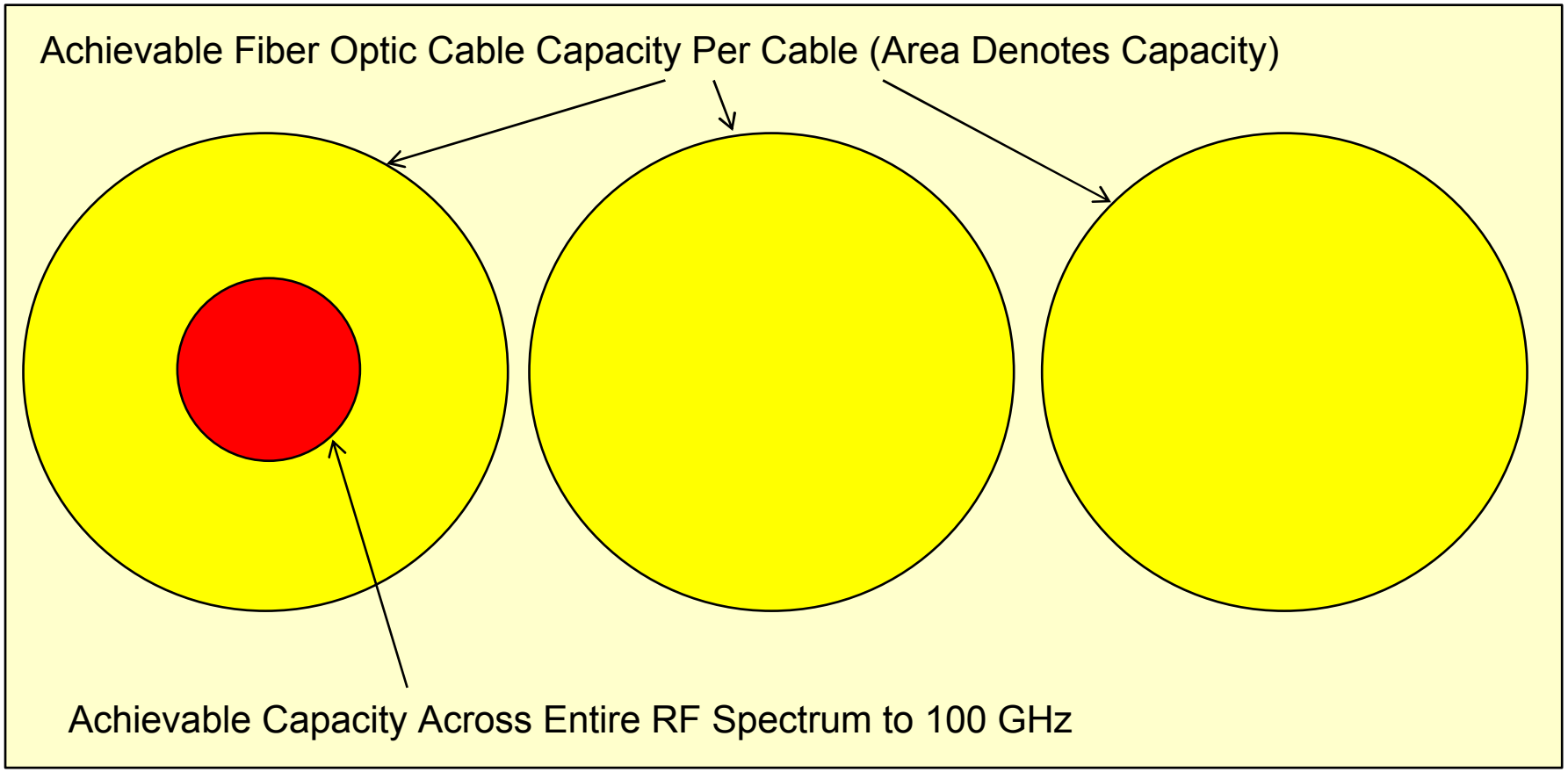
Technology	Spectral Efficiency (bps/Hz)	Bandwidth Used Downlink	Downlink Capacity
EV-DO	0.75	3 X 1.25 MHz	2.81 Mbps
HSPA	0.75	1 X 5 MHz	3.75 Mbps
HSPA	0.75	2 X 5 MHz	7.5 Mbps
WiMAX	1.0	1 X 10 MHz 2/3 downlink	6.7 Mbps
LTE	1.5	1 X 10 MHz	15 Mbps

Wireline Capacity Compared to Wireless



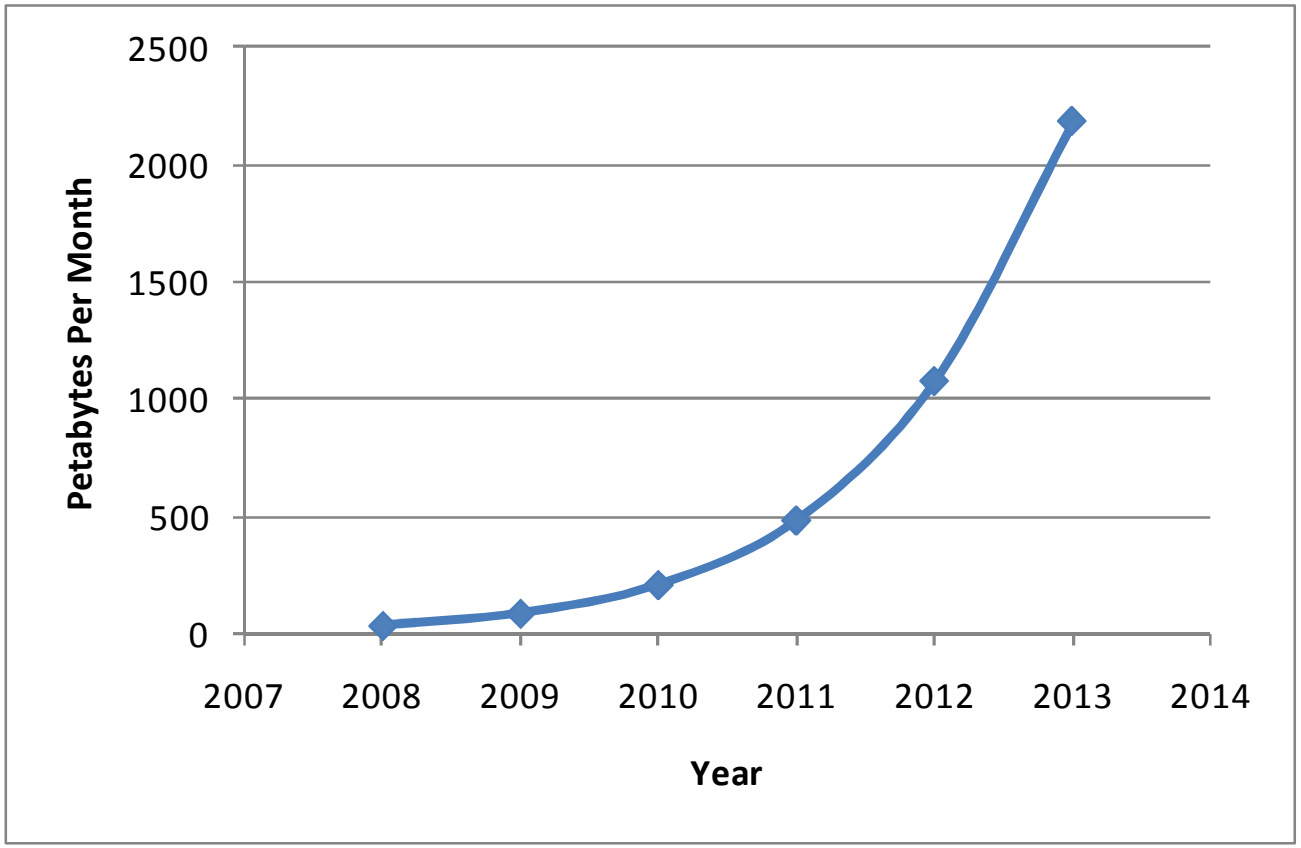
Fiber vs. RF

One fiber strand has more capacity than entire RF spectrum.



Mobile Broadband Data Consumption

Mobile Broadband: 131% annual growth
Many 3G networks: data traffic > voice traffic



Source: Cisco

Traffic and Network Management

Traffic Management:

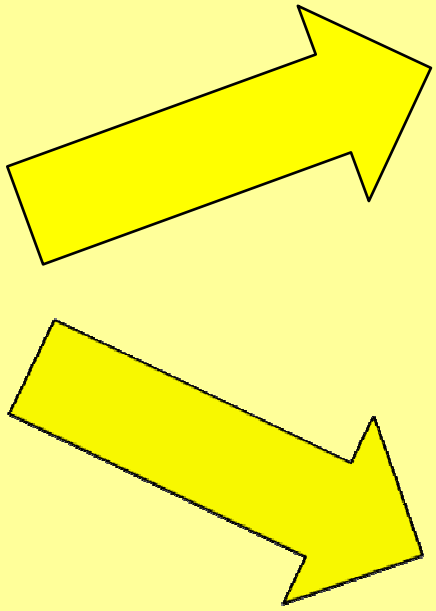
Guaranteed versus non-guaranteed bit rate

Bit error rate

Minimum and maximum throughput

Amount of delay (traffic prioritization)

Admission control



Next Generation Services:

VoIP

Reliable video in conversational and streaming modes

New services

Capacity Management:

Allocating capacity per user service plans

Preventing abusive use of the network

Device Improvements

Performance Improvements in User Device

Benefits

That Individual User

Also Benefits

All Users in the Network Since Network is Now More Efficient

Types of Improvements:
- More efficient voice handling
- Advanced radio capabilities
- Awareness of network type

Conclusion

Not all bits are the same.

Scheduling, prioritization, and resource allocation is core to efficient and optimal wireless operation.

Network neutrality impacts traffic management, hence affecting:

- Creative new applications based on QoS (e.g., reliable voice, reliable video).
- Implementation of network management schemes (e.g., slowing down users with excessive traffic).
- Creation of flexible service plans.
- Deployment of most efficient device/network configurations.